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(poster presentation)

Simulation of indirectly driven implosions using a gas-filled hohlraum heated by KPP-smoothed laser beams

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Smoothing of all 10 Nova beams using kinoform phase plates (KPP) is planned as a method for reducing the effects of laser-plasma instabilities in indirectly-driven gas-hohlraum implosion experiments. We have developed a method to mock up the behavior of KPP beams using the Lasnex ray-tracing package. This model includes realistic beam profiles both along and perpendicular to the beam axis. Smoothing by spectral dispersion (SSD) will also be implemented on Nova and is treated in our model by dynamically repointing each ray during the course of the calculation. SSD can produce an oscillation in the pointing of the beam-spot centroid at the modulation frequency. The oscillation can be eliminated if the SSD is critically dispersed and if the laser power is constant, but transient motion still occurs durning the turn-on of the foot and peak of the shaped laser pulse typically used for indirect-drive implosions. The period of this oscillation is of order 400 ps and the largest amplitude of the motion of the spot on the hohlraum wall is of order +/-50 microns at turn-on of the foot for standard Nova implosion experiments. The SSD also modifies the shape of the beam spot even when critically dispersed. We will present results from Lasnex simulations to quantify the sensitivity of implosion symmetry to these effects.

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